The potential energy of position is the source of the energy of the storm. It is shown in his analysis that a system in which the mass of air is brought down vertically from equilibrium can contain the required energy. Of the various kinds of storms, the *boeëns* that occur with a rapid rise of pressure and a rapid fall of temperature, and the tornadoes that, according to W. M. Davis, originate in the neighborhood of the boundary of cold and warm air masses, appear best to conform to the analysis and calculations of Doctor Margules.

The phenomena of atmospheric motion in the great storm fields which we call cyclones are less penetrating than in the *boeën*. These occur in the middle and high latitudes and appear to originate from the interaction of cold and warm air masses which lie horizontally contiguous. But afterwards in equilibrium the cold air spreads out in the lower strata. The author points out that it is not impossible that these great storms are created from the potential energy of a similar initial condition. Doctor Margules seems to disprove the condensation theory of storms advanced by Espy, Ferrel, and Oberbeck, but agrees with Professor Bigelow's idea that the cyclone does not originate from the energy of the latent heat of condensation, but that the energy of storms develops from the interchange of location of masses of air of unequal temperatures.

Doctor Margules' analysis and calculations, however, give only a general idea of the source of storm energy. A satisfactory model of the cyclone with asymmetrical distribution of temperature has not yet been constructed. Moreover, the peculiar conditions in the field of the tropical hurricane in which there does not usually occur any great temperature difference on the ground and where the cyclonic distribution of temperature reaches only to the height of a few kilometers, also need another investigation.

AIR AND WATER TEMPERATURES.

By W. F. COOPER, Michigan Geological Survey. Dated Lansing, Mich., December 16, 1905.

(1) LOWER MICHIGAN.

An examination of the yearly mean isothermal lines for lower Michigan, as given in the reports of the Michigan Section of the Climate and Crop Service of the U. S. Weather Bureau in cooperation with the Michigan State Weather Service, affords some suggestive comparisons. We have, for instance, prepared Table 1, showing the higher latitude of the annual isothermal lines on the west shore of lower Michigan as compared with the east shore for the years 1900–1904, inclusive.

TABLE 1.

Year.	Temperature.	Miles farther north on west shore of the lower peninsula.	Year	Temperature.	Miles farther north on west shore of the lower peninsula.
	° F.			° F.	
1900	48	10	1903	46	103
	46	20		44	66
1901	46	31		44	54
	44	60		43	30
1902	48	1	1904	42	42
	46	52		41	78
	44	60		40	40

From these data we see that the isotherm of 48° has been an average distance of 6 miles farther north on the west shore than on the east; that of 46°, 53 miles; of 44°, 60 miles; of 42° and 40° for the year 1904, 43 and 40 miles, respectively. An average of these combined data shows the same temperature averages extending 46 miles farther northward on the west side of the lower peninsula of Michigan.

As an exception to this general rule of higher isothermal lines on the western shore of lower Michigan, the isotherm of 48° for 1903 is eight miles farther north in Macomb County, adjacent to Lake St. Clair, than it is where Van Buren County is washed by the waters of Lake Michigan. Likewise during 1904 the line for 45° is sixteen miles farther south in Berrien County than in Macomb. Both these isothermals, however, show some deflection to the northward on approaching Lake Michigan.

(2) LAKE MICHIGAN.

Comparing the isothermals on the east and west sides of Lake Michigan, as given in the reports of the section directors of Michigan and Wisconsin, we obtain the following results:

TABLE 2.

Year.	Temperature.	Miles farther south on the east side.	Miles farther north on the east side.	Year.	Temperature.	Miles farther south on the east side.	Miles farther north on the east side.
	° F.				° F.		
1900	48	5	.....	1902	46	.....	50
	46	.....	38	1903	46	.....	100
	42	.....	25		44	.....	88
1901	48	23	.....	1904	44	4	.....
	46	.....	16		42	.....	33
1902	48	26	.....				

Taking into account the negative figures in this comparison, the results show the average temperature on the east side of the lake 36 miles farther north than on the east coast of Wisconsin.

(3) SPECIAL OBSERVATIONS AND THEORY.

The object of this paper is to present some data showing the cause of this distribution of temperature. In obtaining the temperature observations thermometer No. 7529 by H. J. Green was used. The readings of the temperatures of the air over the land and of the water in the bay were taken on the west side of Saginaw Bay and east of Tobico Inlet, northwest of Bay City. Less than five minutes elapsed between the readings in the air over the land, and in the water. During August 12, 13, 15, 16, 17, and 18, 1904, the thermometer was read at 5:30 a. m. and hourly from 7:30 a. m. to 10:30 a. m., and 11:15 a. m., and hourly from 1:00 p. m. to 7:00 p. m., excepting at 6:00 p. m. August 22 and 23 readings were taken consecutively from 1:00 p. m. to 11:15 a. m. the following forenoon. August 25 and 26 the thermometer was read from 5:30 a. m. to 5:30 a. m., being consecutive for 24 hours ending August 26. The full record is given in Table 12. Judging from the last two series of observations the maximum and minimum temperatures were very nearly obtained by the readings taken from 5:30 a. m. to 7:00 p. m. These temperatures of air and water at Tobico will now be compared with the minimum and maximum readings taken by the cooperative observers of the Weather Bureau at Bay City, Midland, Saginaw (west side), and Hayes. Bay City is situated six miles southeast from Tobico, Midland sixteen miles west and somewhat south, Saginaw nineteen miles almost due south, Hayes thirty-six miles east-northeast across Saginaw Bay. These readings can be most conveniently presented in tables.

TABLE 3.—*Maximum and minimum temperatures, August 12, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	73.5	68	5.5
Tobico, air	79	51	28
Bay City	80	48	32
Midland	80	58	22
Saginaw	80	48	32
Hayes	78	44	34

The range of water temperature at Tobico compared with the range of the air temperature is 19 per cent. The winds were light and variable. The average of the air temperatures on the day in question was 71°, of the water 72°.

TABLE 4.—*Maximum and minimum temperatures, August 13, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	71 +	68.	3 +
Tobico, air	80.5	66.	14.5
Bay City	77	47	30
Midland	78	58	20
Saginaw	87	63	24
Hayes	82	61	21

The day was cloudy until 9:30 a. m. The readings closed at 11:15 a. m. The air temperature at Tobico increased 14.5°; that of the bay 3° or 20.7 per cent. The average of six readings taken during the forenoon was 71.6° for the air and 68.9° for the water. The wind at Saginaw and Midland was from the southwest; at Bay City from the north.

TABLE 5.—*Maximum and minimum temperatures, August 15, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	74	67	7
Tobico, air	84	62	22
Bay City	86	63	23
Midland	76	52	24
Saginaw	89	66	23
Hayes	86	59	27

The day was clear with westerly winds blowing. From 5:30 a. m. to 2 p. m. the range of the water temperature was 33 per cent of the range of the air temperature at Tobico. Locally the result in moderating the temperature at Tobico is somewhat apparent, but we would rather expect the ratio of the ranges of temperature at Midland and Hayes to be reversed.

TABLE 6.—*Maximum and minimum temperatures, August 16, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	77	69	8
Tobico, air	79.7	62.0	17.7
Bay City	81	60	21
Midland	70	50	20
Saginaw	83	61	22
Hayes	78	56	22

It rained during the night of August 15 and 16, clearing up by noon time. The wind was down the bay, or from the northeast during the period of fair weather. At Bay City, Midland, and Hayes the wind was from the northwest; at Saginaw from the southwest. The water temperature range was 45 per cent of the range of the air temperature. This very considerably higher ratio of the water temperature is very probably due to the action of the wind sweeping down the bay, thereby exposing a relatively larger water surface to the wind within a unit of area, and to the action of the waves in entrapping particles of air. Not having the temperature of the rain water which fell during the night it is impossible to state how this would modify that of the water in the bay. The water temperature only dropped 3° from 7 p. m. to 5:30 a. m. the next morning, while that of the air fell 9° in the same interval. It is apparent that under such conditions we would have the climate somewhat modified, the main tendency being to check sudden changes near the adjacent windward shore and to increase the differences of temperature between the water and the air, especially at night. With the exception of Midland, the air temperatures increase with distance from the bay. The highest minimum temperature is found adjacent to the shore as we should expect; away from the water it oscillates irregularly as can be seen from the tables. The average air temperature at Tobico was 71.25°, of the water 73.07°.

TABLE 7.—*Maximum and minimum temperatures, August 17, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	77	71	6
Tobico, air	80	62	18
Bay City	75	60	15
Midland	74	50	24
Saginaw	82	60	22
Hayes			

The day was clear with the wind at Tobico from the west during the greater part of the forenoon, shifting to the north at 1 p. m. At Bay City the wind was from the northwest, at Saginaw from the southwest, and at Midland from the west. The range of the water temperature was 33 per cent of the range of the air temperatures at Tobico, being intermediate between periods when the wind is off and on shore. The main trend of the bay is northeast. It is apparent that this northerly wind decidedly influenced the temperature of Bay City which is situated directly south of the bay about two miles. It is also noticeable that Saginaw was benefited to a considerably less extent, being some fourteen miles farther south, and the effect of the lake breeze is much less apparent. The still greater range at Midland is apparently explained by its location and the westerly breeze blowing there. These on shore winds are only effective in modifying climatic conditions within relatively circumscribed areas. This deduction is not only borne out in part by our own data, but also by an examination of the isothermal charts of lower Michigan for 1900–1904, inclusive, to which we have already had occasion to refer. An average of twelve air and water temperatures gives 72.8° for the former and 73.9° for the latter at the stations near Tobico. It is also believed that an examination of the observations for August 17, and other sources of information, show that insular exposures are more decidedly influenced by the climatic factors that tend to prevent low minimum temperatures, than by those tending to modify the maxima. This is especially true in the late summer and fall. In the spring and early summer we should expect the reverse. As to the former conclusion, as we shall see further on, this is due to the very considerable capacity water has for absorbing heat during the day and retaining it at night.

TABLE 8.—*Maximum and minimum temperatures, August 18, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	75.3	66.0	9.3
Tobico, air	75.2	57.0	18.2
Bay City	75	58	17
Midland	78	60	18
Saginaw	78	59	19
Hayes	80	45	35

During the day the sky was clear with an easterly wind blowing on shore at Tobico; at Bay City and Saginaw the wind was from the northeast; at Midland from the northwest. The records of the cooperative observer of the Weather Bureau at Hayes are wanting as to the wind. The temperature range of the water in Saginaw Bay was 50 per cent of the temperature range of the air over the land. Comparing this date with those previously discussed, it was noted that with a north wind blowing diagonally across the bay, the ratio of water temperature range to air temperature range was 33 per cent; with a northeasterly wind blowing down the bay, 45 per cent; and with an east wind, 50 per cent. While,

theoretically, we might expect the greatest increase of water temperature with a full breeze coming from the northeast down the main axis of the bay, this result is very probably modified by the shallow waters of the lower reaches of Saginaw Bay, giving greater play to wave action. However, the same effect would very likely occur with a cold wave from the west. This on shore action, as noted above, is not only pronounced in increasing the relatively greater warmth of the water, but also in modifying proportionately that of the adjacent air to the west. It is also true that this modification of relative temperature would be greater during the night on account of the greater radiation of the heat from the land. The temperature at Hayes compared with that at Midland shows a greater range of temperature at the former place, probably due to this easterly wind.

TABLE 9.—*Maximum and minimum temperatures, August 22–3, 1904.*

Location.	Maximum.	Minimum.	Hayes.
	°	°	°
Tobico, Saginaw Bay	74.5	66.0	8.5
Tobico, air	76	50	26
Bay City	75	45	30
Midland	78	58	20
Saginaw	78	44	34
Hayes	83	45	38

During portions of these two days observations were taken consecutively from 1:00 p. m. to 11:15 a. m.

Our maximum readings were taken August 22; minimum readings the following morning. The weather was clear, wind from the northwest, shifting to the west at about 7 a. m., August 23. At Bay City and Midland the wind blew from the southeast and south; at Saginaw from the southwest. During this time the range of water temperature, compared with that of the air, was 32.6 per cent. During the forenoon of the 23d the air temperature increased 24° by 11:15 a. m., and the water temperature increased 5.7° within the same time, or 23.75 per cent of the range on land. While during the afternoon the maximum air temperature was 1.8° greater than the water, at 5:30 a. m. the next morning the lowest air temperature was 16° lower than the minimum water temperature, showing the very considerable capacity of the water to retain heat during the night, and the action that it would have on the air temperature over the land with an on-shore wind blowing. The averages of our air and water temperatures near Tobico are, respectively, 64.5° and 69.9° during the entire period of about 24 hours.

TABLE 10.—*Maximum and minimum temperatures, August 25–6, 1904.*

Location.	Maximum.	Minimum.	Range.
	°	°	°
Tobico, Saginaw Bay	75.5	63.3	12.2
Tobico, air	85	46	39
Bay City	83	44	39
Midland	80	60	20
Saginaw	82	43	39
Hayes	80	(?)	(?)

During the 24 hours ending at 5:30 a. m., August 26, 1904, we have a continuous series of observations of air and water temperatures. At Tobico the weather was fair, with quite a strong westerly wind blowing throughout that time. At Bay City, Midland, Saginaw, and presumably at Hayes, the wind was also from the west and southwest. Our maximum readings were taken on the 25th; minimum on the 26th. The average of eighteen readings gives an air temperature of 67.07°, that of the water being 69.9° for the same time. During the 25th the land and water temperatures increased 13° and 7.5°, respectively, the ratio of the ranges being 57.6 per cent, followed by a drop of 39° and 12.2° of the air and water temperatures, respectively, by 5 a. m. on the 26th, or only 31 per cent of change of the water temperature relative to the change of the air temperature. Air and water temperatures taken simultaneously on the other side of the bay would be desirable for comparison here. These readings, however, clearly show the property water has of absorbing and retaining heat to a great extent.

Tables 11 and 12 show the maximum and minimum temperatures for Saginaw, Bay City, and Midland, as furnished by Mr. C. F. Schneider, Section Director, Grand Rapids, Mich., as also our own observations near Tobico.

TABLE 11.

Station.	1904. Aug. 12. Max.	Aug. 12. Min.	Aug. 13. Max.	Aug. 13. Min.	Aug. 15. Max.	Aug. 15. Min.	Aug. 16. Max.	Aug. 16. Min.	Aug. 17. Max.	Aug. 17. Min.
	°	°	°	°	°	°	°	°	°	°
Tobico, Saginaw Bay	73.5	68	71 +	68	74	67	77	69	77	71
Tobico, air	79	51	80.5 +	66	83	62	79.7	62	80	62
Bay City	80	48	77	47	86	63	81	60	75	60
Midland	80	58	78	58	76	52	70	50	74	50
Saginaw	80	48	87	63	89	66	83	61	82	60
Hayes	78	44	82	61	86	59	78	56	.....	.....

tation.	1904. Aug. 18. Max.	Aug. 18. Min.	Aug. 22. Max.	Aug. 22. Min.	Aug. 23. Max.	Aug. 23. Min.	Aug. 25. Max.	Aug. 25. Min.	Aug. 26. Max.	Aug. 26. Min.
	°	°	°	°	°	°	°	°	°	°
Tobico, Saginaw Bay	75.3	66	74.5	.....	.....	66	75.5	.....	.....	63.3
Tobico, air	75.2	57	76	.....	.....	50	85	.....	.....	46
Bay City	75	58	75	.....	.....	45	83	.....	.....	44
Midland	78	60	78	.....	.....	58	80	.....	.....	60
Saginaw	78	59	78	.....	.....	44	82	.....	.....	43
Hayes	80	45	83	.....	.....	45	80	.....	.....	.....

In the interval of time covered by these observations the average water temperature was 72.11°, that of the air 72.38°. It is more probable, however, as shown by our readings for 24 hours, that the average water temperature is about 4° greater during the latter part of August than that of the air. The ratio of change of water temperature relative to that of the air temperature is less than 34.4 per cent. In this factor, taking into account the prevailing southwesterly winds, we find a partial explanation of the insular

TABLE 12.—*Air and water temperatures at Tobico, near Bay City.*

Hour.	1904. Aug. 12. Tobico, air.	Aug. 12. Tobico, Saginaw Bay.	Aug. 13. Tobico, air.	Aug. 13. Tobico, Saginaw Bay.	Aug. 15. Tobico, air.	Aug. 15. Tobico, Saginaw Bay.	Aug. 16. Tobico, air.	Aug. 16. Tobico, Saginaw Bay.	Aug. 17. Tobico, sir.	Aug. 17. Tobico, Saginaw Bay.
	°	°	°	°	°	°	°	°	°	°
1:00 a. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3:00 a. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5:00 a. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5:30 a. m.	51	68	66	68	62	67	62	69	62	71
7:30 a. m.	64.5	69	69.3	68.3	66.2	68.6	65	69	67.4	71.3
8:30 a. m.	.....	.....	69	68.5	71	71	62	69.3	72.5	72.5
9:30 a. m.	72.5	71	71.4	69	73.5	73	66.3	70.3	76.2	73.6
10:30 a. m.	.....	.....	73.5	.....	73.5	73	68.2	71	78	75
11:15 a. m.	74	73.5	80.5	71	73.3	73.3	72.7	72	80	76
1:00 p. m.	78	73.6	.....	.....	83	74	79.7	75.6	79	77
2:00 p. m.	78	73.3	.....	.....	81.6	74	76.2	76.5	78.6	76
3:00 p. m.	79	73.5	.....	.....	.....	.....	76.3	77	74.8	75.5
4:00 p. m.	78	73.5	.....	.....	79	74	76.6	76.5	72	74.3
5:00 p. m.	76	73.5	.....	.....	84	73.3	79	76.5	68.2	73.2
6:45–7:00 p. m.	71	71.6	.....	.....	71.5	73	71	74.1	65	71.1
9:00 p. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11:00 p. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Average	71	72	71.6	68.9	74.4	72.2	71.25	73.07	72.8	73.9

TABLE 12.—*Air and water temperatures at Tobico, near Bay City*—Cont'd.

Hour.	1904. Aug. 18. Tobico, air.	Aug. 18. Tobico, Saginaw Bay.	Aug. 22. Tobico, air.	Aug. 22. Tobico, Saginaw Bay.	Aug. 23. Tobico, air.	Aug. 23. Tobico, Saginaw Bay.	Aug. 25. Tobico, air.	Aug. 25. Tobico, Saginaw Bay.	Aug. 26. Tobico, air.	Aug. 26. Tobico, Saginaw Bay.
	°	°	°	°	°	°	°	°	°	°
1:00 a. m.	.....	.....	.....	.....	53	67.3	.....	.....	48	65
3:00 a. m.	.....	.....	.....	.....	51	66.5	.....	.....	46	64
5:00 a. m.	.....	.....	.....	.....	.....	.....	.....	.....	46	63.3
5:30 a. m.	57	66	.....	.....	50	66	72	68	46.5	64
7:30 a. m.	65.4	68	.....	.....	61	67	76	70	.....	.....
8:30 a. m.	65.5	68.6	.....	.....	69	68	79	71.5	.....	.....
9:30 a. m.	70.5	69.8	.....	.....	69.5	69	79	72.5	.....	.....
10:30 a. m.	69.3	72.2	.....	.....	72.5	70.4	79	72.5	.....	.....
11:15 a. m.	75.2	74	.....	.....	74	71.7	80.5	73.4	.....	.....
1:00 p. m.	73.3	74.8	73	73.2	.....	.....	85	75.3	.....	.....
2:00 p. m.	73.4	75.3	75.5	74.5	.....	.....	79	75.1	.....	.....
3:00 p. m.	73	75	76	74.2	.....	.....	78.2	75.5	.....	.....
4:00 p. m.	73	74.1	74.2	73.6	.....	.....	74.1	74.5	.....	.....
5:00 p. m.	72	73	72.6	72.6	.....	.....	70.5	73.5	.....	.....
6:45–7:00 p. m.	68	71	62.6	71	.....	.....	63	69	.....	.....
9:00 p. m.	.....	.....	59	69	.....	.....	55	66.5	.....	.....
11:00 p. m.	.....	.....	55	68	.....	.....	50.5	66	.....	.....
Average	69.7	71.8	.....	.....	*64.5	*69.9	.....	.....	*67.07	*69.9

* Average of the 24-hour period ending with the last observation of this date.

climate of lower Michigan. Moreover, the temperature of the water, as a rule, being greater than that of the air from about 7 p. m. until about 9 a. m. the day following, the tendency would be to increase the temperature of the adjacent shores. On the other hand, the air temperature being greater during the remainder of the day, the water would tend to establish an equilibrium by reducing the air temperature, the mean range probably approaching a mean of the average ranges of air and water temperatures. The more prolonged period of higher water temperature is doubtless the greater factor in this question.

INTERNATIONAL METEOROLOGICAL DEFINITIONS AND SYMBOLS.

Compiled by E. R. MILLER. Dated Washington, D. C., January 1, 1906.

Progress in meteorology, both practical and theoretical, depends, more than in the case of other sciences, upon international uniformity in methods of observing, recording, and publishing data. Such uniformity may be secured by adherence to the recommendations of the international meteorological congresses, conferences, and committees. The reports of the meetings of these organizations have been published in the principal European languages, including English, and the resolutions and recommendations of the various conferences from 1872 to 1891 were codified and published by Prof. H. Wild, of St. Petersburg, in his Repertorium für Meteorologie, Band XVI, No. 10, 1893.

The nomenclature, definitions, and classification of clouds recommended by the International Meteorological Committee in 1894, was made the official system of the United States Weather Bureau in 1895.

The international meteorological symbols were devised by the permanent committee appointed by the International Meteorological Congress that met in Vienna in September, 1873. A few additional symbols have been adopted and the official definitions have been modified at the meetings held at Munich in 1892, at Paris in 1896, and at Innsbruck in 1905. With the exception of the thunderstorm symbol (⚡) they have not been adopted by the United States Weather Bureau for use by its regular observers, but were recommended for use by the cooperative observers in a circular issued by the Chief Signal Officer in 1883, and again by the Chief of the Weather Bureau in a circular dated January 1, 1894. They were introduced for the first time into the tables of data published in the Annual Report of the Chief of the Weather Bureau in the volume for 1903–04.

The circular of January 1, 1894, unfortunately contained several typographical errors, which also crept into the subsequent reprints of that circular in the Smithsonian Meteorological Tables, edition of 1897, in the MONTHLY WEATHER REVIEW for July, 1898, page 311, and in the Classification of Clouds and International Meteorological Symbols recently published by the Weather Bureau.

It is with a view to presenting a complete and accurate statement to American observers that the following revision has been prepared.

We are indebted to Mr. A. L. Rotch, American member of the International Cloud Committee and Director of the Blue Hill Observatory, and Messrs. H. H. Clayton and S. P. Ferguson, of the Blue Hill Observatory staff, for valuable criticisms and the notes accompanying this article.

CLASSIFICATION OF CLOUDS.

Upper clouds.—Cirrus (*a*). Cirro-stratus (*b*).

Intermediate clouds.—Cirro-cumulus (*a*). Alto-cumulus (*a*). Alto-stratus (*b*).

Lower clouds.—Strato-cumulus (*a*). Nimbus (*b*).

Clouds formed by diurnal ascending currents.—Cumulus. Cumulo-nimbus.

High fogs.—Stratus.

The clouds marked (*a*) usually occur in separate or rounded masses and are most frequently seen in dry weather. Those marked (*b*) are forms which are widely extended or completely cover the sky, as in wet weather.

HEIGHTS OF CLOUDS.

In the following table[1] are given the mean heights of clouds as determined by observations during the "cloud year" 1896–97, except in the case of Allahabad, where the observations were made from December, 1898, to March, 1900:

Mean heights of clouds.

SUMMER.

Kind of clouds.	Upsala, Sweden.	Pavlovsk, Russia.	Potsdam, Germany.	Trappes, France.	Toronto, Canada.	Blue Hill, Mass.	Washington, D. C.	Allahabad, India.	Manila, P. I.
	m.	m.	m.	m.	m.	m.	m.	m.	m.
Cirrus	8,176	8,814	9,054	8,936	10,901	9,525	10,358	10,765	11,133
Cirro-stratus	6,362	8,094	8,085	7,851	8,943	10,099	10,620	.....	12,968
Cirro-cumulus	6,457	4,600	5,893	5,826	8,883	6,673	8,826	11,278	6,823
Alto-stratus	2,774	.....	3,293	3,792	4,241	6,247	5,772	.....	4,302
Alto-cumulus	3,432	3,053	3,632	3,676	3,516	3,763	5,030	4,502	5,707
Strato-cumulus	1,771	1,847	2,163	1,815	2,005	1,160	2,870	.....	1,901
Nimbus	1,197	.....	1,792	1,079	.....	1,189	1,926	836	1,382
Cumulus	1,685	1,764	1,880	1,574	1,697	.....	.....	1,757	1,826
Cumulus (summit)	2,000	2,406	2,100	2,160	.....	2,900	3,068	.....	.....
Cumulus (base)	1,454	1,635	1,445	.....	.....	1,781	1,182	.....	.....
Fracto-cumulus	1,832	2,146	1,707	1,402	.....	.....	.....	.....	.....
Cumulo-nimbus	.....	.....	.....	.....	.....	.....	.....	1,714	6,454
Cumulo-nimbus (summit)	3,971	4,682	3,990	5,485	.....	9,031	4,965	.....	.....
Cumulo-nimbus (base)	.....	1,615	2,057	2,525	.....	1,601	1,750	.....	.....
Stratus	.....	839	675	944	.....	510	838	.....	1,065

WINTER.

Cirrus	6,980	8,740	8,070	8,514	9,978	8,612	9,511	12,884	10,634
Cirro-stratus	5,455	7,090	7,653	5,849	8,530	8,893	9,526	13,342	11,638
Cirro-cumulus	6,131	5,985	5,406	5,634	8,246	6,155	7,413	11,553	6,421
Alto-stratus	4,090	.....	2,988	3,822	4,180	4,574	4,801	.....	.....
Alto-cumulus	4,114	3,172	3,349	4,274	2,494	3,658	3,822	6,257	4,638
Strato-cumulus	1,964	1,501	1,415	1,614	1,542	1,604	2,399	3,550	2,322
Nimbus	987	.....	1,285	1,053	.....	646	1,804	5,003	1,488
Cumulus	1,516	.....	1,499	1,112	1,326	.....	.....	1,344	1,821
Cumulus (summit)	1,649	1,602	1,744	2,371	.....	1,623	2,855	.....	.....
Cumulus (base)	714	1,118	991	.....	.....	1,544	1,198	.....	.....
Fracto-cumulus	1,219	.....	1,025	1,429	.....	.....	.....	2,619	.....
Cumulo-nimbus	.....	.....	.....	.....	.....	.....	.....	2,521	3,136
Cumulo-nimbus (summit)	5,175	.....	4,735	3,850	.....	.....	3,730	.....	.....
Cumulo-nimbus (base)	1,377	.....	3,825	.....	.....	.....	.....	.....	.....
Stratus	506	1,000	607	.....	.....	608	1,132	.....	.....

An inspection of the table will suffice to establish the validity of the following rules:

[1] Rapport sur les observations internationales des nuages au Comité International Météorologique par H. Hildebrand Hildebrandsson. Part II, 1905, Table I, page 2.